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Management

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Forest Insect and Disease Conditions in the Southwest 1980

COVER PHOTOS

Top left: Laboratory reared pandora moth larvae emerging from eggs on ponderosa pine.

Bottom right: Ceratocystis canker on aspen.

Forest Insect and Disease Conditions in the Southwest - 1980

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Foreword

This report on the 1980 forest insect and disease conditions in the Southwest was compiled by the Forest Pest Management[1/] staff in the Regional Office, and also includes reports and conditions on State and private lands in Arizona and New Mexico by the respective state entomologists.

Because forest pest damages can significantly affect management objectives, pest management must be considered an integral part of forest management. The role of the pest management specialist is to provide land managers with the necessary technical assistance and coordination needed to incorporate sound prevention and suppression strategies into long-term forest management plans. In dealing with forest pests, entomologists and pathologists have used and continue to emphasize the use of integrated pest management (IPM). IPM involves the use of a variety of control methods--cultural, biological, and chemical--either singly, or in combination, to manage forest pests. Because many of the effects of forest pests can be prevented, IPM strategies should be incorporated into all stages of the resource management planning and budgeting processes.

1/ Formerly named Forest Insect and Disease Management (FIDM).

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Insect and Disease Conditions

Conditions in Brief

Minor increases in bark beetle activity were observed throughout the Region in 1980. Numbers of ponderosa pines killed by the mountain pine beetle increased on the Kaibab Plateau, Ariz. Tree losses due to mountain pine beetle in New Mexico were substantially lower. Although still at a low level, numbers of Ips engraver beetle-killed trees increased throughout the central portion of Arizona; however, only minor tree mortality occurred in the remaining portions of the Region. Western pine beetle caused widely scattered ponderosa pine mortality throughout central and southwestern New Mexico.

Defoliators caused the most significant tree damages in 1980. Defoliation caused by western spruce budworm was especially heavy in mixed conifer stands on the Kaibab National Forest and Grand Canyon National Park, Kaibab Plateau, Ariz., and the Carson, Santa Fe, and Cibola National Forests, N. Mex. Total acres defoliated by the budworm increased from 131,000 acres in 1979 to over 299,000 in 1980. Defoliation of aspen by the western tent caterpillar increased in both area and intensity. Heaviest defoliation occurred on the Santa Fe National Forest and near Bandelier National Monument, N. Mex.

No pandora moth defoliation was recorded in the Region in 1980; however, defoliation by this insect is expected to reoccur on the Kaibab Plateau, Ariz., in 1981.

Egg mass surveys conducted in the fall of 1980 show that pandora moth populations and defoliation will increase on the Kaibab Plateau, Ariz., in 1981.

Dwarf mistletoes continued to cause damage throughout the Region. Surveys were conducted and RMYLD simulated yield programs were run for five Ranger Districts and two Indian Reservations.

Annosus root rot, shoestring root rot, and white pocket root rot (Polyporus tomentosus) were found causing mortality on the Apache-Sitgreaves National Forests, Ariz., and Carson National Forest, N. Mex.

Black stain root disease was found in Douglas-fir on the Lincoln National Forest and the Mescalero Apache Indian Reservation, N. Mex.

Status of Insects

Mountain pine beetle, Dendroctonus ponderosae Hopk. Mountain pine beetles continued to attack and kill mature and overmature ponderosa pines throughout the northern portions of the Southwest. Tree mortality resulting from these bark beetles increased for the second consecutive year in northern Arizona, but remained at a relatively low level in New Mexico.

In Arizona, most activity occurred on the North Kaibab Ranger District and the adjoining Grand Canyon National Park, Kaibab Plateau. Although the majority of the tree losses detected consisted of singles and small groups of two to five trees, several groups of 25 to 100 or more scattered beetle-killed trees were observed on both the Forest and the Park.

In northern New Mexico, isolated mountain pine beetle infestations continued to cause tree losses. During the past year, beetle-killed pines were observed scattered throughout the older pine stands of the Questa, Canjilon, and El Rito Ranger Districts, Carson National Forest, and the Pecos, Cuba, Jemez, and Tesuque Ranger Districts, Santa Fe National Forest. Although these beetle-killed trees were too widely scattered to justify a salvage program,

many of them were removed by free use cutting or as firewood by local residents.

An infestation on the Jicarilla Indian Reservation caused extensive tree mortality on the Archuleta Mesa; however, mortality on Dulce and Jicarilla Mountains was widely scattered and consisted mainly of individual trees.

Minor isolated infestations were also observed in the Chuska Mountains in northern Arizona and northwestern New Mexico on Navajo Indian Reservation lands.

Ips engraver beetles, Ips spp. Although no Ips infestations of consequence occurred in the Region in 1980, the incidence of Ips-killed trees increased in some areas of the Region and remained the same in others. The most noticeable increases in Ips-killed trees occurred on the Mormon Lake, Long Valley, Blue Ridge, and Sedona Ranger Districts, Coconino National Forest, in Arizona. Many of these Ips-attacked trees may have been predisposed to attack by low winter temperatures in 1978.

Minor isolated pockets of Ips activity were also observed on the Prescott, Tonto, and Apache-Sitgreaves National Forests in Arizona, and the Gila National Forest in New Mexico.

Western pine beetle, Dendroctonus brevicomis LeC. This bark beetle caused widely scattered tree mortality, singly and in small groups of two to five trees, throughout much of the ponderosa pine type in central Arizona and southwestern New Mexico. Trees attacked were mainly mature and/or overmature; weakened by lightning strikes, fire, diseases, or other factors.

In 1980, tree losses resulting from these beetles were most numerous on the following forests and Indian Reservations:

Arizona

- Apache-Sitgreaves National Forests
- Coconino National Forest
- Kaibab National Forest
- Tonto National Forest
- Fort Apache Indian Reservation

New Mexico
Cibola National Forest
Gila National Forest
Lincoln National Forest
Mescalero Apache Indian Reservation

Western spruce budworm, Choristoneura occidentalis Free. The western spruce budworm continued to cause extensive defoliation to mixed conifer stands throughout much of the Southwest. Acres of visible defoliation increased from 131,000 in 1979 to over 299,000 acres in 1980. Areas with the heaviest defoliation[2/] included the Kaibab National Forest (38,426 acres) and adjoining Grand Canyon National Park (28,032 acres), Ariz., and the Carson (108,450 acres), Santa Fe (69,325 acres), and Cibola (17,810 acres) National Forests, N. Mex. Total acres and intensities of defoliation by land ownerships are summarized in Table 1.

Egg mass densities per square meter of foliage increased in all areas surveyed, indicating an increasing population trend in 1981.

Sampling also continued on the Western Spruce Budworm Suppression and Evaluation Project in the Jemez Mountains, Santa Fe National Forest, N. Mex., for the fourth consecutive year. Results indicated that, although budworm populations increased in both the treated and untreated areas, western spruce budworm population densities and subsequent defoliation remained considerably lower in the treated areas. Table 2 shows a summary of the larval density and egg mass data for these areas.

Pandora moth, Coloradia pandora Blake (cover photo). Pandora moth defoliation was first detected on the North Kaibab Ranger District, Kaibab National Forest, in 1979. Because this insect has a 2-year life cycle (Fig. 1),

2/ Figures include private and other Federal lands adjoining or within National Forest boundaries.

with defoliation occurring every other year, no defoliation was observed on the North Kaibab Ranger District in 1980. However, according to egg mass data collected during the summer of 1980, defoliation in 1981 is expected to surpass that observed in 1979. Heavy defoliation to ponderosa pine is expected to occur at the following locations: (1) Jacob Lake Inn, (2) Jacob Lake Campground, (3) along portions of Highway 89 Alternate from Forest Service Road 244 on the west to Forest Service Road 225 on the east, and (4) over most of the area heavily defoliated in 1979.

PANDORA MOTH

Coloradia pandora Blake
Kaibab Plateau 1980

HOST - PONDEROSA PINE - Pinus ponderosa Laws.

LIFE STAGES

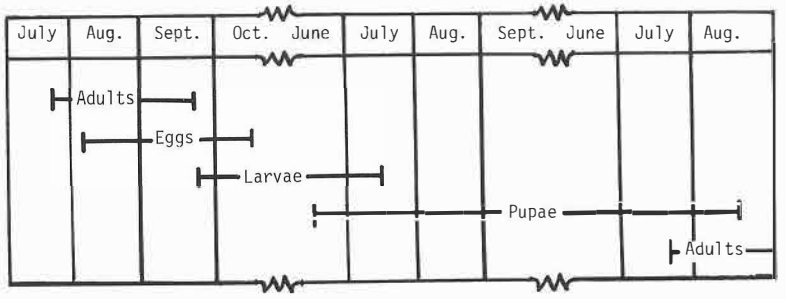

Figure 1. Chart showing pandora moth life stages during its 2-year life cycle based on information collected on the North Kaibab Ranger District, Kaibab National Forest in 1979 and 1980. Time periods for each life stage are averages. A very small percentage of the population might be found earlier or later than the indicated period.

Western tent caterpillar, Malacosoma californicum (Pack.). The western tent caterpillar continued to defoliate aspen stands on the Santa Fe National Forest for the fifth consecutive year. Western tent caterpillar defoliation increased in both area and intensity in all locations and was heaviest on the Coyote, Jemez, Espanola, and Tesuque Ranger Districts. Defoliation to aspen stands was also noticeably heavier in the vicinity of Bandelier National Monument, especially along Highway 4 between the Cerro Pelado fire lookout on the west and the township of Los Alamos to the east.

Scattered pockets of light to moderate tent caterpillar defoliation were also observed on the Questa, Taos, Tres Piedras, El Rito, and Canjilon Ranger Districts, Carson National Forest, N. Mex.; the North Kaibab Ranger District, Kaibab National Forest, Ariz.; and in isolated aspen stands on the Fort Apache Indian Reservation, Ariz.

Table 1: Status of western spruce budworm infestation, Southwestern Region, 1980.

Landownership Class	Outbreak Area (Thousand Acres)			
	L	M	H	TOTAL
National Forest	65.49	95.84	46.05	207.38
Other Federal 1/	19.37	8.75	0.41	28.53
State, County, or Municipal	---	---	---	---
Non-industrial, private	35.63	20.25	7.37	63.25
Industrial, private	---	---	---	---

L = Light M = Medium H = Heavy

1/ Includes National Parks, Indian Reservations, and other Federal lands.

Table 2: Population trend of western spruce budworm for treated and untreated areas in project area of the Jemez Mountains, Santa Fe National Forest, N. Mex.

	1977		1978		1979		1980	
	PRESPRAY		POSTSPRAY					
	T	UT	T	UT	T	UT	T	UT
No. of larvae per 100 buds	14.9	12.4	1.0	6.9	0.9	8.7	0.8	8.9	1.2	17.5
No. of egg masses per sq. m.			1.7	9.9	0.4	10.1	0.6	15.8	4.9	48.0

T = Treated UT = Untreated

Other Insects

COMMON NAME	SCIENTIFIC	HOST	LOCALITY	REMARKS
Douglas-fir beetle	Dendroctonus pseudotsugae Hopk.	Douglas-fir	Carson NF & Navajo Indian Reser., N. Mex.	Widely scattered singles and small groups.
Fir coneworm	Dioryctria abietivorella (Grote)	Douglas-fir	N. Mex.	Scattered.
Fir engraver beetle	Scolytus ventralis LeC.	Douglas-fir & true firs	Lincoln, Cibola, & Gila NF's, N. Mex.; Coconino, Kaibab, & Apache-Sitgreaves NF's, Ariz., & Navajo Indian Reser., N. Mex., & Mescalero Apache Indian Reser., N. Mex.	Isolated pockets of 2-10 trees.
Pine coneworm	Dioryctria auranticella (Grote)	ponderosa pine	Ariz. & N. Mex.	Scattered.
Pinyon needle miner	Coleotechnites edulis (Hodges & Stevens)	pinyon	Navajo Indian Reser., Ariz.	Scattered pockets of defoliation around vicinity of Antelope Lake.
Ponderosa pine cone beetle	Conophthorus ponderosae (Hopk.)	ponderosa pine	Ariz. & N. Mex.	Throughout both states, destroying almost all of cone crops in some areas of Ariz.
Red turpentine beetle	Dendroctonus valens LeC.	ponderosa pine	Kaibab NF, Ariz.	Widely scattered.
Roundheaded pine beetle	Dendroctonus adjunctus (Blandf.)	ponderosa pine	Lincoln NF; Mescalero-Apache Indian Reser., N. Mex.	Scattered isolated pockets of activity.
Scarab beetles	Phyllophaga sp.	pinyon pine	Magdalena RD, Cibola NF, N. Mex.	Minor defoliation by adult beetles.
Spruce beetle	Dendroctonus rufipennis (Kby.)	Engelmann spruce	Cibola NF, N. Mex.; Apache-Sitgreaves NF's, & Ft. Apache Indian Reser., Ariz.	Small isolated infestations.

Status of Diseases

Dwarf mistletoe, Arceuthobium spp. Southwestern dwarf mistletoe, A. vaginatum subsp. cryptopodum (Engelm.) Hawks. & Wiens, continued to have a major impact on growth and yield of ponderosa pine (Pinus ponderosa) in Region 3. Eighteen thousand three hundred (18,300) acres of infected ponderosa pine on five Ranger Districts and two Indian Reservations were surveyed; 8,300 by FPM, 10,000 by District. The data collected were used to run the RMYLD simulated yield program to assist in planning management alternatives for the infected stands.

A post-suppression survey to assess the effectiveness of a suppression project was conducted on 320 acres of the Cloudcroft Ranger District, Lincoln National Forest. The residual volumes and infection level were within acceptable limits and compared closely with figures predicted by RMYLD. Emphasis on using RMYLD as a tool for management is being continued Regionwide.

A mistletoe control project to poison infected overstory trees on the Tusayan Ranger District, Kaibab National Forest, was partially completed. The project will be finished in 1981 with work consisting of repoisoning individual trees not killed, as well as completing the original acreage.

The mistletoe control project in three campgrounds in Horsethief Basin, Bradshaw Ranger District, Prescott National Forest, was successfully completed. Additional control work in the summer home area is being planned; a presuppression biological examination is scheduled for 1981.

Data on an additional 100 plots were taken in the cooperative SWMCYLD (Southwestern Mixed Conifer Yield) project by personnel from Region 3, Rocky Mountain Forest and Range Experiment Station, and the University of Arizona. This is the second year of a 3-year program to collect data for the growth and yield model of mixed conifer stands infected by dwarf mistletoe.

Root rots. Surveys over 1,000 acres of mixed conifer on the Apache-Sitgreaves National Forests revealed a root disease complex in corkbark fir (Abies lasiocarpa), white fir (Abies concolor), and Douglas-fir (Pseudotsuga menziesii), caused by Fomes annosus and Armillaria mellea. Polyporus tomentosus was also found in roots of Engelmann spruce (Picea engelmannii).

Data collection was completed in the cooperative study between Rocky Mountain Forest and Range Experiment Station and Region 3 on the effects of logging on corkbark fir decay and mortality. Results will be published in 1981.

Verticicladiella spp. was found in roots of Douglas-fir in the Sacramento Mountains, Lincoln National Forest, Cloudcroft, N. Mex., and on the Mescalero Apache Indian Reservation, N. Mex. This is a new host record for Region 3.

Pre- and post-fumigation surveys of population levels of soil-borne pathogens at the Albuquerque Tree Nursery were conducted in the spring of 1980. Pre-fumigation populations of Fusarium spp. and Pythium spp. were as high as 133 and 14 propagules per gram (ppg), respectively. Spring fumigation was effective in reducing levels of Pythium to 1.3 ppg, but Fusarium increased to 724 ppg. Spring sampling of fall fumigated plots showed continued reduced levels of Pythium sp., but an increased level of Fusarium spp. over levels prior to fumigation. No significant losses from damping-off fungi have been detected.

Fusarium roseum caused stem cankers on container seedlings at Bureau of Indian Affairs greenhouses on the Jicarilla Indian Reservation and in Albuquerque (Fig. 2).

A pilot test of mycorrhizal enhancement of nursery soil has been delayed due to the lack of greenhouse facilities. The project will be continued in 1981.

Abiotic diseases. Several areas of the Region reported winter damage. Species affected were ponderosa pine, Rio Grande cottonwood

(Populus fremontii var. wislizenii), tamarisk (Tamarix pentandra), and willow (Salix sp.).

A complex of over watering and resultant chloride buildup in soil caused damage and mortality to ponderosa pines on the golf course of the Inn of the Mountain Gods, Mescalero Apache Indian Reservation.

Trees along 9 miles of road were damaged by salt in the Sandia Mountains of the Cibola National Forest.

Animal Damage. Extensive bear damage to corkbark fir was observed in stands surveyed for root diseases on the Apache-Sitgreaves National Forests.

Figure 2. Fusarium roseum (Lk.) em. Snyd. & Hans., causing stem canker on ponderosa pine container stock.

Other Diseases

COMMON NAME	SCIENTIFIC	HOST	LOCALITY	REMARKS
Atropellis canker	Atropellis piniphila	Ponderosa pine	Mescalero Apache Indian Reser., N. Mex.	Cankers on many saplings in stands surveyed for dwarf mistletoe (200 acres).
Pinyon needle rust	Coleosporium jonesii	Pinyon pine	Sacramento Mountains, N. Mex.	Very little damage.
Limb rust	Peridermium filamentosum	Ponderosa pine	Springerville Ranger District, Apache-Sitgreaves NF's, Ariz.	Scattered trees, little damage.

Forest Pest Management Activities in 1980

The Forest Pest Management staff of the USDA Forest Service is charged with responsibility for detection, evaluation, and suppression of forest pests, and for providing technical assistance to forest land managers on all Federal lands in Arizona, New Mexico, and western Texas. In addition, FPM personnel also cooperate with the States of Arizona and New Mexico in carrying out forest pest management on State and private lands through the Cooperative Forest Pest Action Program.

Detection Surveys

As one of its major responsibilities, FPM personnel detect and monitor insect and disease outbreaks and infestations. This is accomplished through a combination of both aerial and ground survey techniques. Aerial surveys are used to detect new outbreaks, monitor ongoing infestations, and to determine the extent and location of damage.

Aerial surveys were conducted on 14.68 million acres from July through October 1980. Acres surveyed are listed below by State and ownership.

After the surveys are completed, maps showing the location, extent, and kinds of outbreaks occurring are sent to the resource managers of the respective administrative units.

STATE	OWNERSHIPS	ACRES (millions)
Arizona	National Forest	5.09
	National Park Service	0.17
	Indian Lands	1.82
	Other Federal*, State and Private	0.00
New Mexico	National Forest	4.80
	National Park Service	0.00
	Indian Lands	0.42
	Other Federal*, State and Private	2.38
TOTAL		14.68

*Other Federal ownership includes Bureau of Land Management, Department of Energy, and U.S. Military installations.

Field Surveillance

Land managers and forest workers should be alert for any unusual insect or disease activity as they conduct their normal field activities. Aerial surveys can only detect damage that has occurred, while forest workers in the field can often discover the beginning of a potential problem. Prompt reporting of new or unusual insect or disease activity is necessary for early detection of potential pest problems. Detection forms and surveillance kits are provided to forest managers. Managers should report information on the Forest Insect and Disease Surveillance Work Sheet forms furnished by FPM (Fig. 3). Check appropriate boxes and make sure all pertinent information is provided. Probably the most important section of the work sheet is the "Remarks" section, in which managers can further describe the nature of the problem. Often, it is the comments in the remarks section that are the most helpful to entomologists and pathologists in identifying the problem.

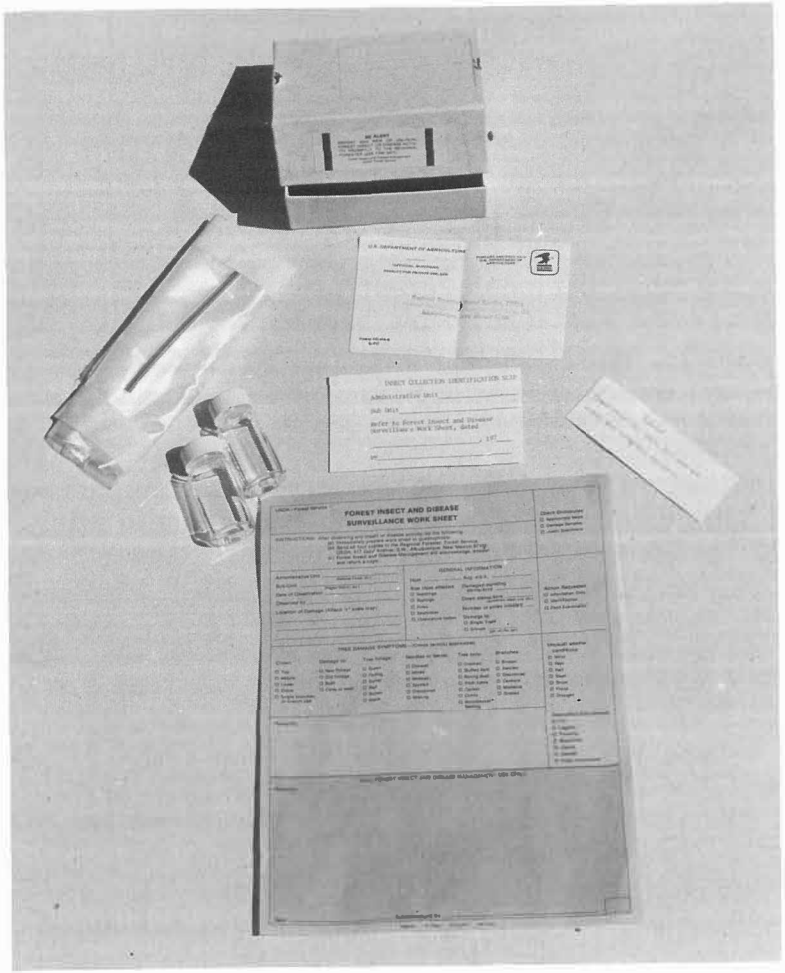

Figure 3. Forest Insect and Disease Surveillance Work Sheet and mailing kit.

Evaluation

FPM personnel not only inform forest managers of existing and potential problems, but also provides evaluations containing recommendations on how to manage pest problems utilizing concepts of integrated pest management.

Entomology: Last year, entomologists were involved in several new and continuing projects: 1) establishment of a silvicultural demonstration area to minimize western spruce budworm losses while fulfilling other timber management objectives, Carson National Forest, N. Mex.; 2) fourth-year monitoring of a western spruce budworm suppression and evaluation project on the Santa Fe National Forest, N. Mex., to determine long-term effects of treatment with carbaryl spray; 3) third-year loss assessment survey to determine tree damage and losses from western spruce budworm in relation to the population dynamics of the insect; 4) cooperation with Forest Service Research to evaluate the efficacy of several B.t. formulations against the western spruce budworm; and 5) screening tests to evaluate the efficacy of several insecticides against the pandora moth.

Pathology: Major projects included: 1) evaluation of dwarf mistletoe on the Elk Springs Burn, Mescalero Apache Indian Reservation, N. Mex.; 2) evaluation of the progress of the Tusayan Ranger District, Kaibab National Forest, Ariz., mistletoe control project; 3) evaluation of dwarf mistletoe in Upper Tonto Creek campground, Payson Ranger District, Tonto National Forest, Ariz.; 4) evaluation of tree damage at the Inn of the Mountain Gods golf course, Mescalero Apache Indian Reservation, N. Mex.; 5) evaluation of damage to trees at Chaco Canyon National Monument, N. Mex.; 6) evaluation of Armillaria mellea root rot in ponderosa pine plantations, Jemez Ranger District, Santa Fe National Forest, N. Mex; 7) hazard tree evaluation of trees at existing picnic grounds on the Sandia Ranger District, Cibola National Forest, N. Mex.; 8) evaluation of hazard trees and disease conditions at sites scheduled for development on the Sandia Ranger District, Cibola National Forest, N. Mex.; 9) evaluation of spring fumigation at the Albuquerque Tree Nursery; and 10) evaluation of mold affecting germination of range shrub seeds, Albuquerque, N. Mex.

State of Arizona Insect and Disease Conditions State and Private Lands

by Robert Celaya 3/

Pine engraver beetle attacks decreased on State and private lands in Arizona in 1980. Most of the damage observed was caused by the pinyon Ips in Prescott, Flagstaff, and Payson. The presence of green pinyon firewood precipitated most of the attacks on ornamental pinyon trees. Ips beetles also infested ponderosa pines in the Prescott, Flagstaff, Payson, and the Lakeside-Pinetop areas. The outbreak recorded in Payson last year collapsed.

The pandora moth was observed in May in the Prescott area. The moth has not caused any serious defoliation to ponderosa pine, but the potential exists.

Needle miner defoliation was more widespread in the State on both ponderosa and pinyon pine. Needle discoloration and defoliation was heaviest on ponderosa pine in the Show Low-Lakeside area. Needle miner damage was also visible on pinyon pine in Payson and Prescott. Many of the trees were also severely infested with pinyon needle scale.

Conifer sawfly defoliation increased on pinyon and ponderosa pine in 1980. Sawfly populations west of Springerville continued to defoliate and kill pole-sized ponderosa pines, particularly in open, grassy areas.

3/ Forest entomologist with the Division of Forestry, Arizona State Land Department.

Sycamore anthracnose was prominent in the Oak Creek Canyon area in early May. The distorted, discolored, and sparse foliage on the trees caused a great deal of concern to the residents of the area. However, the disease was more unsightly than serious and most of the trees refoliated by midsummer.

Numerous miscellaneous pest problems were reported throughout the State. Tent caterpillars were quite numerous on several species of oak in early spring. A species of cicada attracted attention in the Show Low-Lakeside-Pinetop area in June. Elm leaf beetles were widespread throughout the State and caused defoliation and discoloration. Roundheaded pine beetles, alder flea beetles, conifer aphids, tip moths, and numerous gall-producing insects were also encountered.

Pine engraver beetles, Ips spp. In Arizona, the pinyon ips, Ips confusus (LeC.), was the most destructive species identified on State and private lands. Insects were often brought in with infested fuelwood. Most of these tree losses can be prevented by informing woodcutters about the insect. Other Ips beetle infestations on ponderosa pine continued to decline. Warm, wet winters for the last 2 years may be improving the vigor and resistance of the trees. The infestation that killed numerous trees in the Payson area last year collapsed. Information on prevention was distributed throughout the area and may have helped reduce the problem.

Pandora moth, Coloradia pandora Blake. Defoliation by this insect was light in Prescott. The larvae were scattered throughout the area and were not present in high enough numbers to cause serious defoliation. However, based on several collections during the year, all of the stages were identified and indicate a 1-year life cycle. Normally, this insect has a 2-year life cycle, with defoliation occurring every other year. In this case there is a possibility of overlapping generations; the larvae present

on the trees will be monitored through next spring. There may be one generation per year at this low elevation.

Needle miners, Coleotechnites spp. The needle miner on ponderosa pine in the Show Low-Lakeside area caused light to moderate defoliation in 1980. The infestation increased over that of last year, but did not cause heavy defoliation. Several trees defoliated by these insects were killed by Ips beetles.

Pinyon needle scale, Matasucoccus acalyptus Herb. The pinyon needle scale continued to damage and kill pinyons in the Prescott area. The outbreak has been active for at least 5 years and is expected to continue for several more years.

Conifer sawflies, Neodiprion spp. A sawfly infestation west of Springerville continued on about 600 acres of scattered ponderosa pine. These insects have not infested adjacent, heavier stocked stands which appear to be more attractive. The sawfly may be aggregating in the open site because of the faster evaporation rate and subsequent lower humidity. However, the fact that the larval colonies are located on the most exposed portions of trees, and are more susceptible to predation and parasitization, may offset the advantages of the lower humidity. Sawflies were also common on pinyon pine last spring and summer. Larvae and adults of the insects collected indicate several species are involved. None of the species is expected to become a problem.

Sycamore anthracnose, Gnomonia platani Kleb. This disease was identified in several areas in the State in May, but was most prominent in the Sedona-Oak Creek Canyon area. The warm, wet weather last spring provided an ideal environment for the fungus. Tree mortality is not expected unless the disease occurs for several successive years.

State of New Mexico Insect and Disease Conditions State and Private Lands

by Tony Smith 4/

The number of bark beetle-killed trees increased on State and private forested lands throughout New Mexico during 1980. Scattered ponderosa pines, singly and in small groups, were killed by the mountain pine beetle near Raton. Near Ruidoso and Brazos, the western pine beetle continued to kill ponderosa pines; tree losses were also especially heavy in areas within and adjacent to the Lincoln National Forest. Spruce beetle-killed trees detected on the Baca Location west of Los Alamos in 1979 were verified in 1980. In northern New Mexico, the number of Ips engraver beetle-killed trees increased appreciably northwest of Las Vegas and near Raton.

Defoliation by certain insect caterpillars increased on State and private forested lands in 1980. Western tent caterpillars defoliated aspen over much of north-central New Mexico for the fifth consecutive year. In all, over 30,000 acres were partially to completely defoliated. Defoliation of ornamental spruce, true fir, and Douglas-fir by the tussock moth continued to increase in both Santa Fe and Ruidoso. No evidence of the tussock moth on State and private lands in Los Alamos and on the Elena Gallegos Grant, Albuquerque, New Mex. was detected. Western spruce budworm defoliation

4/ Forest entomologist with New Mexico Department of Agriculture.

increased on the Philmont Scout Ranch and on the west side of Moreno Valley. Defoliation by the budworm was also detected on the Angel Fire resort for the first time. The pinyon needle miner was also reported on 1,000 acres of private land near Santa Fe.

Annosus root rot was detected on dying subalpine firs near Chama, N. Mex. Also, near Chama, heavy accumulations of snow and ice, followed by subzero temperatures, caused some top-killing to sawtimber-size ponderosa pines.

Mountain pine beetle, Dendroctonus ponderosae Hopk. In northeastern New Mexico, an increase in numbers of mountain pine beetle-killed ponderosa pines was observed near Raton. Groups of beetle-killed trees were detected in the vicinity of Lake Maloya, while on adjacent private lands, activity was widely scattered. Tree mortality consisted primarily of single "faders" and groups of 5 to 35 dead trees on this 16,000-acre watershed. The area was easily accessible and salvage logging was undertaken in October with much of the wood utilized for fuelwood. Single "faders" were also detected on the Philmont Scout Ranch and on the Vermejo Park properties, but tree losses were less than those reported in 1979. Scattered "faders" were also detected in an area northwest of Las Vegas that had been severely damaged by heavy hail.

Western pine beetle, Dendroctonus brevicomis LeC. This beetle continued to attack ponderosa pine on State and private lands near Ruidoso and Capitan. Trees attacked were previously injured by fire or lightning, or infected with dwarf mistletoe or other diseases. Western pine beetle-killed trees were mainly located on ridgetops and on south and west-facing slopes where soils are shallow and have a low water holding capacity. Beetle-killed trees also occurred at the lower elevations where ponderosa and pinyon-juniper types intermingle. This insect, together with dwarf mistletoe, caused severe damage in areas within and adja-

cent to the Lincoln National Forest. Ponderosa pines on private lands near Grants and Gallup were also heavily infested by this insect.

Spruce beetle, Dendroctonus rufipennis (Kby.) An infestation of this beetle was first detected on the Baca Location west of Los Alamos in 1979, but early snows prevented verification until July 1980. The infestation is about 4 years old and presently covers 75 acres. Overmature spruce in the 20- to 50-inch diameter range were attacked. The area will be logged in 1981-82 and dead trees salvaged. Unless proper sanitation and salvage logging occurs, the infestation will increase in 1981 and, perhaps, 1982.

Engraver beetles, Ips spp. Ponderosa pine losses due to these beetles increased considerably in 1980. A new outbreak of Arizona five-spined ips, Ips lecontei Sw., occurred in pole-sized ponderosa pines heavily damaged by hail in 1979, northwest of Las Vegas. Approximately 900 acres of trees were severely damaged by hail and are presently considered susceptible to attack. Suppression of the outbreak is being planned and the trees will be utilized at a local log cabin manufacturing plant in Las Vegas, N. Mex.

On Kaiser Steel property, northeast of the Canadian River, large amounts of ponderosa pine slash facilitated a buildup of the pine engraver, Ips pini (Say). The infested slash consisted of large butt sections, tops, and limbs which were spread haphazardly over 2,000 acres. Although these beetles have not attacked a significant number of green trees, the infestation could increase to outbreak levels if sanitation and salvage are not accomplished in 1981.

Other engraver beetles causing ponderosa pine and pinyon pine mortality included Ips confusus (LeC.), Ips latidens (LeC.), and Ips calligraphus (Germar). Many landowners in Santa Fe, Torrance, Bernalillo, Mora, and San Miguel counties reported problems with one or more of

these species. Since some of the infestations occurred as a result of landscapers planting infested trees, several cases were taken to small claims court by individuals suing for damages. Other Ips beetle infestations also occurred as a result of injuries to trees during home construction, particularly in areas encroaching into pinyon-juniper woodlands.

Western tent caterpillar, Malacosoma californicum (Pack.). Western tent caterpillars continued to defoliate aspen over a wide area in north-central New Mexico for the fifth consecutive year. Aerial surveys detected nearly 10,000 acres of moderate defoliation and approximately 20,000 acres of complete defoliation on the Baca Location. Aspen in the Camp May picnic grounds near Los Alamos were also heavily defoliated; causing much concern among local residents. A nucleopolyhedrosis virus was observed in some later instar larvae.

Douglas-fir tussock moth, Orgyia pseudotsugata (McD.) This insect continued to be a problem in Santa Fe and Ruidoso. Ornamental spruce, true fir, and Douglas-fir were defoliated for the thirteenth consecutive year in Santa Fe and for the fifteenth consecutive year in Ruidoso. Numbers of infested trees increased in both cities in 1980. Efforts to control the tussock moth in Santa Fe continued to be thwarted by lack of interest, fear of chemical pesticides, and the erratic results of B.t. One previously undetected infestation on private land near Santa Fe was discovered during an aerial survey in June. Subsequent ground examination determined that the population had collapsed in 1979.

Tussock moth defoliation throughout the rest of the State declined to undetectable levels. In Los Alamos, there were no reports of infested trees on private or Federal lands for the first time in 15 years, and a 1980 larval survey conducted on the Elena Gallegos Grant, near Albuquerque, failed to show a single larva

on the previous 600-acre infestation treated with nucleopolyhedrosis virus in 1979.

Western spruce budworm, Choristoneura occidentalis Free. Western spruce budworm increased in both intensity and area infested on State and private lands. Defoliation was heaviest on the Philmont Scout Ranch which showed a fourfold increase over that of last year. An increase in budworm defoliation was also detected on the west side of Moreno Valley, and an egg mass survey conducted in 1980 indicated further increases could be expected in 1981. Visible defoliation was detected for the first time on the Angel Fire resort area; total acres defoliated amounted to 1,500 acres of Douglas-fir-true fir host type.

Pinyon needle miner, Coleotechnites edulicola Hodges and Stephens. A new outbreak of this insect was reported on 1,000 acres of private land near Santa Fe. Defoliation ranged from light to moderate with some trees losing an entire year's foliage. Spray tests using 2 percent Sevimol ®, and Orthene ® at 2 percent and 4 percent, were conducted to determine treatment efficacy. Preliminary examination of infested needles showed some effect, but results will not be fully evaluated until May 1981.

Root rot, Fomes annosus. For the last several years, near Chama, groups of 3 to 30 dead and dying subalpine fir have been reported from aerial surveys as Douglas-fir, attacked and killed by the Douglas-fir beetle, Dendroctonus pseudotsugae Hopk. Ground examinations in 1980, however, showed that these dead trees were, in fact, subalpine firs and mortality was due to the root rot, Fomes annosus.

Snow, ice, and low temperature damage. Sawtimber-size ponderosa pines, near Chama, were top-killed (2-3 feet) by heavy snow and ice loads. Accumulations of heavy, wet snow on tree tops followed by extended periods of subzero

temperatures caused this winter injury. Several trees were felled to be certain that neither insects nor infectious diseases caused the top-kill. The damage has been observed for 3 consecutive years.

Recent Publications

Beatty, J. S. 1980. Tree damage, Inn of the Mountain Gods golf course, Mescalero Apache Indian Reservation, N. Mex. R-3 81-3.

Hofacker, Thomas H., Tony Smith, Donald P. Graham, Roger E. Sandquist, John W. Barry, and Gary Blackwell. 1980. 1979 Douglas-fir tussock moth suppression projects: Santa Fe National Forest and Elena Gallegos Grant. R-3 80-2.

Mielke, M. E., and R. E. Wood. 1980. Mold affecting laboratory germination of range shrub seeds. R-3 80-4.

Parker, D. L. 1980. Pest management guide--mountain pine beetle, Dendroctonus ponderosae Hopkins, in ponderosa pine, Kaibab Plateau, Arizona. R-3 80-8.

Parker, Douglas L., Robert E. Acciavatti, Eugene D. Lessard, and Iral R. Ragenovich. 1980. Western spruce budworm suppression and evaluation project using carbaryl, 1977-1979, New Mexico, Final Report. R-3 81-2.

Parker, D. L., and I. R. Ragenovich. 1979. Western spruce budworm suppression and evaluation project using carbaryl. Progress Rep. No. 3. R-3 80-1.

Rogers, Terrence J. 1980. A Douglas-fir tussock moth loss assessment evaluation. R-3 80-6.

Stein, Catherine R. 1980. Western spruce budworm damage assessment project. Progress Rep. No. 2. R-3 80-5.

Wood, R. E. 1980. Southwestern dwarf mistletoe in the Elk Springs Burn, Mescalero Apache Indian Reservation, N. Mex. R-3 80-3.

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